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United States  
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Rural  
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REA Bulletin  
1728F-700

September 1993

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# REA Specification for Wood Poles, Stubs and Anchor Logs

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UNITED STATES DEPARTMENT OF AGRICULTURE  
Rural Electrification Administration

BULLETIN 1728F-700

**SUBJECT:** REA Specification for Wood Poles, Stubs and Anchor Logs

Incorporated by reference in 7 CFR Parts 1728 and 1755

**TO:** All Borrowers

**EFFECTIVE DATE:** September 2, 1993.

**EXPIRATION DATE:** Not applicable. Incorporated by reference in 7 CFR 1728 and 1755.


**OFFICE OF PRIMARY INTEREST:** Transmission Branch, Electric Staff Division.

**PREVIOUS INSTRUCTIONS:** This Bulletin replaces Bulletin 50-18, REA Specification for Wood Poles, Stubs and Anchor Logs, issued June 2, 1987.

**FILING INSTRUCTIONS:** Discard Bulletin 50-18, dated June 2, 1987, and replace with this bulletin. File with 7 CFR Part 1728.

**PURPOSE:** To describe the minimum acceptable quality of wood poles, stubs, and anchor logs permitted to be purchased by or for REA borrowers and the plans of procurement under which they may be purchased.

for

  
Administrator

August 13, 1993  
Date



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## APPENDIX A: Material Requirements

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## ABBREVIATIONS

ACA	Ammoniacal Copper Arsenate
ACZA	Ammoniacal Copper Zinc Arsenate
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers' Association
CCA	Chromated Copper Arsenate
CuN	Copper Naphthenate
REA	Rural Electrification Administration
SPIB	Southern Pine Inspection Bureau
USDA	United States Department of Agriculture
WCLIB	West Coast Lumber Inspection Bureau

## DEFINITIONS

Certificate of Compliance must consist of a certification, signed by an authorized employee of the producer, that the material shipped meets the requirements of this specification and any supplementary requirements cited in a contract or order under which it was purchased.

Independent Inspection relates to examination of a "lot" of material by an independent inspector employed by a commercial agency.

Inspection means an examination of material in sufficient detail to insure conformity with all phases of the specification under which it was purchased. Inspection prior to treatment must be made after the products are manufactured and ready for treatment. If poles are trimmed to length, inspection prior to treatment may be done prior to framing, providing inspection hammer brands are not removed during framing. When framing is done after white inspection, the framing must be inspected after treatment.

Producer is used to describe the party who manufactures and treats poles.

Purchaser refers to either the REA borrower or to a contractor acting as the borrower's agent, except where a part of the specification specifically refers to only the borrower or the contractor.

Quality control designee refers to an individual designated by the producer to be responsible for quality control.

Reserve treated stock consists of timber products treated in accordance with this specification, prior to and in anticipation of the receipt of specific orders, and held in storage ready for immediate shipment.

Supplier is a term used interchangeably with producer.

Transmission poles - Unless otherwise indicated, any pole 50 feet or longer is designated as a transmission pole.

Treating charge refers to all the material treated in a cylinder at one time.

Treating plant is the organization that applies the preservative treatment to the poles.



## 1. SCOPE

**1.1** This specification describes the minimum acceptable quality of wood poles, stubs, telephone pedestal stubs, and anchor logs (hereinafter called poles, except where specifically referred to as stubs or anchor logs) purchased by or for REA borrowers, and the plans of procurement under which they may be purchased. Where there is conflict between this specification and any other specification referred to herein, this specification shall govern.

**1.2** The requirements of this bulletin implement contractual provisions between REA and borrowers receiving financial assistance from REA. The contractual agreement between REA and its borrowers requires the borrower's system be constructed in accordance with REA accepted plans and specifications. Each REA electric borrower shall purchase only wood poles produced in accordance with the specifications.

**1.3** Each REA electric borrower shall require each contractor, in writing, to agree to furnish only materials produced in accordance with this bulletin.

**2. RELATED SPECIFICATIONS:** The following listed specifications may be considered as pertinent to this specification, subject to the restrictions in the paragraph under "Scope." All AWPAs references are those in effect in AWPAs Book of Standards 1991.

- a. ANSI 05.1-1987 American National Standard Specifications and Dimensions for Wood Poles
- b. ANSI/ASTM D9-87 American National Standard Definitions of Terms Relating to Timber
- c. Standard No. 17 Grading Rules for West Coast Lumber, West Coast Lumber Inspection Bureau, 1991
- d. Standard Grading Rules for Southern Pine Lumber, Southern Pine Inspection Bureau, 1991
- e. AWPAs C1-91 - All Timber Products - Preservative Treatment by Pressure Processes
- f. AWPAs C4-91 - Poles - Preservative Treatment by Pressure Processes
- g. AWPAs C8-91 - Western Red Cedar and Alaska Yellow Cedar Poles - Preservative Treatment by the Full-Length Thermal Process
- h. AWPAs C10-91 - Lodgepole Pine Poles - Preservative Treatment by Full-Length Thermal Process

- i. AWWA P1-91 - Standard for Coal Tar Creosote for Land and Fresh Water Use and Marine (Coastal Water Use)
- j. AWWA P5-91 - Standards for Waterborne Preservatives
- k. AWWA P8-91 - Standards for Oil-Borne Preservatives
- l. AWWA P9-91 - Standards for Solvents and Formulations for Organic Preservative Systems
- m. AWWA M1-90 - Standards for the Purchase of Treated Wood Products
- n. AWWA M2-91 - Standard for Inspection of Treated Timber Products
- o. AWWA M3-81 - Standard Quality Control Procedures for Wood Preserving Plants
- p. AWWA M4-91 - Standard for the Care of Preservative-Treated Wood Products
- q. AWWA A1-91 - Standard Methods for Analysis of Creosote and Oil-Type Preservatives
- r. AWWA A2-91 - Standard Methods for Analysis of Waterborne Preservatives and Fire-Retardant Formulations
- s. AWWA A3-91 - Standard Methods for Determining Penetration of Preservatives and Fire Retardants
- t. AWWA A5-91 - Standard Methods for Analysis of Oil-Borne Preservatives
- u. AWWA A6-89 - Method for the Determination of Oil-Type Preservatives and Water in Wood
- v. AWWA A7-75 - Standard Wet Ashing Procedure for Preparing Wood for Chemical Analysis
- w. AWWA A9-90 - Standard Method for Analysis of Treated Wood and Treating Solutions by X-Ray Spectroscopy
- x. AWWA A11-83 - Standard Method for Analysis of Treated Wood and Treating Solutions by Atomic Absorption Spectroscopy
- y. AWWA C12-90 - Western Larch Poles - Full-Length Preservative Treatment by Thermal Process.

### 3. GENERAL STIPULATIONS

3.1 Various requirements relating to quality control and inspection are to be found in REA Bulletin 1728H-702, REA Specification for Quality Control and Inspection of Timber Products. These requirements shall be followed. Provisions of this specification and American National Standards Institute (ANSI) 05.1, 1987, "American National Standard Specifications and Dimensions for Wood Poles," which are positive in their wording, shall not be interpreted or subjected to judgment by the quality control designee or an independent inspector. Judgment, although used by quality control personnel and independent inspectors, shall not be the basis for acceptance of material which does not conform to the minimum requirements of this specification.

3.2 Each purchaser shall use a written purchase order to purchase material for use in REA financed systems in order to insure compliance with the standards and specifications. The written purchase order shall contain a provision that specifically requires the producer to comply with these provisions. The purchase order shall contain a provision that specifically requires the producer to make the treating plant and storage areas available, during normal business hours, in order for representatives of either the purchaser or REA to inspect such to determine compliance with the standards and specifications.

3.3 Plans which are acceptable for supplying poles under this specification include:

3.3.1 Insured Warranty Plan: Under this plan, the producer furnishes poles meeting this specification and furnishes a warranty. The warranty shall be issued by an insurance company under terms and conditions acceptable to REA. The insurance company shall submit its plan for assuring quality control to REA for specific approval prior to issuance of these warranties. Currently, there are no insurance policies in effect.

3.3.2 Independent Inspection Plan: Under this plan, the producer furnishes poles meeting this specification, and all poles are then inspected by a qualified independent inspector in accordance with REA Bulletin 1728H-702, REA Specification for Quality Control and Inspection of Timber Products.

The REA borrower has the prerogative to contract directly with the agency for the inspection service. The borrower shall, where practical, select the inspection agency so that the inspector's continued employment is dependent only on performance acceptable to the borrower. The borrower shall be responsible for ensuring that the independent inspection is properly performed. The selected agency shall not subcontract the service to any other agency without prior written consent of the borrower.



The producer shall not interfere with the work of the inspector except to provide notification of the readiness of material for inspection. When circumstances warrant, the producer may deal directly with the agency. The producer shall not treat material before it has been properly inspected in the white, as evidenced by the inspector's hammer mark.

**3.3.3 Quality Assurance Plans:** Under such plans, the producer furnishes poles conforming to this specification as monitored by a quality assurance program acceptable to REA. REA borrower groups or agents for borrower groups endeavoring to operate Quality Assurance Plans shall submit their plans for assuring quality control to REA for specific approval prior to contracting with REA electric or telephone borrowers under such plans.

**3.4** With the exception of reserve treated stock, all invoices for treated timber products shall be accompanied by a copy of the producer's Certificate of Compliance and either a copy of the Independent Inspection Report, the Insured Warranty Certificate, or, for other acceptable plans, a comparable certificate of compliance. The certificate shall be presented to the purchaser with the invoice. For reserve treated stock under the Independent Inspection Plan, inspection reports shall be available from the inspection agencies. The purchaser may obtain these reports from the inspection agency after the purchaser has provided the inspection agency with a list of the charge numbers. (The charge number, as found on the butt, is defined in Appendix A, paragraph 9.5.)

**3.5** Quality control, as exercised by the plant quality control designee, is an important component in the satisfactory production of treated wood. If the purchaser considers the quality control to be inadequate, the purchaser, or an inspection agency which it retains, may, at the time of material inspection at the plant, reject all material from the plant.

**3.6** Poles failing to conform to any provision covered by this specification shall not be shipped to the purchaser.

**3.7** Poles shall be warranted to conform to this specification. Any pole found not in conformance with this specification within 1 year from date of shipment to the purchaser shall be replaced as promptly as possible by the producer. (Preservative retention shall meet the requirements of the specification, as a minimum at time of shipment to the borrower (see Table 10, Exhibit H). A reduction in preservative retention of not more than 10 percent shall be acceptable up to 30 days from date of delivery.)

**3.8** The methods of inspection described herein and in REA Bulletin 1728H-702, REA Specification for Quality Control and Inspection of Timber Products, shall be used no matter which plan is used in producing poles, i.e., Insured Warranty Plan, Independent Inspection Plan or Quality Assurance Plans. The number of poles actually inspected by monitors of quality control

under the Insured Warranty Plan or a Quality Assurance Plan may vary from the number of poles inspected under the Independent Inspection Plan.

#### 4. QUALITY CONTROL

4.1. Producers shall maintain plant and yard conditions that do not promote decay. Producers shall maintain acceptable quality control procedures as evidenced by the quality of the material offered for inspection, or covered by an Insured Warranty or a Quality Assurance Plan.

The quality control procedure of all plants that produce poles under any of the plans described in paragraph 3.3 shall contain at least the following elements:

4.1.1 Quality control shall be the responsibility of a competent individual designated for that specific purpose (quality control designee), together with such staff as may be required. The quality control designee shall be qualified to make the necessary inspections and perform chemical analyses and assays required by this specification. The quality control designee shall verify each step in the production before releasing the material to be inspected by an independent inspector. The independent inspector shall independently repeat the quality control designee's inspections and tests.

4.1.2 An inspection agency performing quality control for a producer shall not also act as the independent inspector of the same producer's poles produced for REA borrowers.

4.1.3 Records, as described in this bulletin and in REA Bulletin 1728H-702, REA Specification for Quality Control and Inspection of Timber Products, shall be maintained by the producer.

4.1.4 Poles not meeting specifications at any stage shall be withdrawn from production by the quality control designee and shall not be offered for acceptance or shipment under any plan until defects have been corrected. Poles not meeting the requirements for penetration or retention of preservative may be re-treated twice only, provided that the total allowable preservative steaming times and temperatures are not exceeded. The identification brand shall be promptly removed from all material found to be nonconforming, subject to the foregoing provision for re-treatment.

4.1.5 The quality control designee and the independent inspector shall both perform all examinations, tests, and assays, individually and independently. Neither shall rely on the other individual's results in the discharge of their duties.



4.2 The producer shall provide the inspectors with full information (drawings, etc.) relating to the requirements contained in any purchase order which is supplementary to this specification.

4.3 The producer shall maintain or have access to adequate laboratory facilities at or very near the treating plant. All chemical tests or analyses associated with the treatment shall be independently performed in this laboratory by the quality control designee, the borrower's independent inspector, or other Quality Assurance Plan monitor. If acceptable to REA on a case-by-case basis, the producer may use a central laboratory.

4.4 Inspection agencies shall maintain their own central laboratory(ies) with a qualified staff capable of completely analyzing the preservative and treatments they are inspecting. The laboratory shall be equipped in accordance with AWWA standards. If acceptable to REA, this central laboratory may be used for the inspector's routine assays. When permission is granted for the inspection agency to use this lab for routine analyses (paragraph 4.3), the assays shall be run promptly, and the results shall be made available the next working day.

**5. RESERVE TREATED STOCK:** Reserve treated stock shall be subject to the following conditions:

5.1 Producers may treat material for reserve treated stock under any of the plans (paragraph 3.3) and shall notify REA in advance of their intention. The notification shall be submitted prior to initial treatment of material for reserve stock, and shall be submitted annually thereafter prior to the beginning of each calendar year. The notification shall be addressed to the Director, Electric Staff Division, Rural Electrification Administration, Washington, DC 20250-1500. Producers shall inform REA of (a) the locations of all storage or distribution yards where reserve treated stock will be maintained, and (b) the designation of the plan and the name of the selected inspection agency, where applicable, which is to be used to provide reserve stock. The producer shall notify REA promptly of any change in the plan or inspection agency.

REA will acknowledge each notification of intent to treat material for reserve treated stock under the REA specification. Purchasers shall not purchase reserve treated stock from plants that fail to comply with the above notification requirements. REA acknowledgement of the plant's advance notice of intention to treat material for reserve treated stock for the calendar year in question shall be evidence of compliance with the notification requirements.

5.2 No material treated with creosote, pentachlorophenol, or Copper Naphthenate shall be shipped for use on an REA borrower's

system later than 1 year following the treatment date branded on the material, unless it complies as follows:

a. The material shall be reassayed by the producer. If conforming to preservative retention requirements, as shown in Table 10, Exhibit H, it may be shipped. Reassayed poles shall be identified on the sawed butt surface with a metal tag showing reassayed date. Such poles shall be acceptable for shipment for 1 year from the date of reassay.

b. If the material is below specification requirements for preservative retention at the time of reassay for shipment, the brand shall be removed and the material reinspected, re-treated, and rebranded in accordance with paragraph 8.5.

5.3 Waterborne treated poles need not be reassayed.

6. **MATERIAL REQUIREMENTS:** All poles shall conform to the material requirements shown in Appendix A, which are primarily extracted from ANSI 05.1-1987.

7. **PRESERVATIVES:** Preservatives shall be selected from one of the following:

7.1 **Creosote:** Creosote shall conform to all requirements of AWPA Standard P1 when analyzed in accordance with the methods in AWPA Standard A1, sections 2, 3, 4, either 5 or 9, and 6.

7.2 **Pentachlorophenol:** Pentachlorophenol shall contain not less than 95 percent chlorinated phenols and shall conform to AWPA Standard P8 when analyzed in accordance with AWPA Standards A5 or A9. The hydrocarbon solvents for introducing the preservative into the wood shall meet the requirements of AWPA Standard P9 Type A, determined in accordance with reference ASTM standards for physical properties.

7.3 **Copper Naphthenate:** Copper Naphthenate (CuN) concentrate used to prepare wood-preserving solutions shall contain not less than 6 percent nor more than 8 percent copper in the form of Copper Naphthenate and shall conform to AWPA Standard P8 when analyzed in accordance with AWPA Standard A5. The hydrocarbon solvents for introducing the preservative into the wood shall meet the requirements of AWPA Standard P9 Type A, determined in accordance with reference ASTM standards for physical properties.

7.4 **Waterborne Preservatives:** Certain formulations of waterborne preservatives are corrosive to metals. Purchasers are

advised to contact suppliers for specific information on the formulation they use.

7.4.1 Ammoniacal Copper Arsenate (ACA) and Ammoniacal Copper Zinc Arsenate (ACZA) shall meet the requirements of AWPA Standard P5, when analyzed in accordance with methods in AWPA Standard A2, A9, or A11. Poles treated with ACA or ACZA shall be held by the treater to allow a minimum of 30 days of drying time after treatment before delivery to the borrowers.

7.4.2 Chromated Copper Arsenate (CCA) shall meet the requirements of one of the formulations given in AWPA Standard P5, sections 4, 5 or 6, and 10 and AWPA Standard C4. Tests to establish conformity shall be made in accordance with AWPA Standard A2, A9, or A11.

7.4.3 Treating solutions of the waterborne salts mentioned in AWPA Standard P5, section 10 shall conform to the pH requirements set forth in AWPA Standard A2, section 9.

7.4.4 Waterborne preservatives are available either as oxides which form non-ionizing chemical compounds in the wood, or as salts which leave ionizing compounds as well as non-ionizing compounds in the wood. Salt formulations of a waterborne preservative are more corrosive to metal than the oxide formulations and may cause surface deposits.

Unless otherwise specified in the purchase order, the oxide formulation of waterborne preservatives shall be supplied. If visible surface deposits appear on the wood within the 1-year warranted period, it is not in compliance with this specification and shall be replaced by the producer.

7.4.5 Douglas-fir and western larch poles shall not be treated with CCA preservatives.

7.4.6 Materials treated with waterborne preservatives shall be free of visible surface deposits.

## 8. PRESERVATIVE TREATMENT

### 8.1 Conditioning Prior to Treatment:

8.1.1 Group "A" poles (see Table 1, Appendix A) which are partially seasoned by natural air circulation shall be air dried within the limits of paragraph 4.2.1, of Appendix A. Extreme care shall be taken to insure that air seasoned poles do not have pretreatment decay in them (refer also to paragraph 5.2 of Appendix A). All poles in this category shall be further artificially conditioned prior to treatment by processes such as Boulton drying, steam conditioning or kiln drying, or heating in the preservative.



8.1.2 Group "B" or group "C" poles which are partially seasoned by natural air circulation, kiln drying, or shed drying shall be further conditioned by Boulton drying (group B, Table 1, Appendix A) or by the steam-vacuum process (group C, Table 1, Appendix A) within the following limits:

8.1.2.1. Boulton Drying:

	Temperature deg. F (maximum)	Duration hours
Green or partially seasoned Douglas-fir (coast)	220	optional*
Western Larch	220	optional*

\*The duration of the Boulton drying shall reduce the moisture content in the poles sufficiently to minimize subsequent season-checking through the treated sapwood. (Frozen poles shall require additional heating to thaw the wood. Time of Boulton drying shall be counted from the time the wood surface is warmed to approximately 150°F.)

8.1.2.2. Steam-Vacuum Process:

<u>Steam (limits)</u>	Temperature deg. F	Max Hours <u>Total Time**</u>
Southern Pine	245 max.	17 <sup>(1)</sup> 20 <sup>(2)</sup>
Douglas-fir (coast)	240 max.	6 <sup>(3)</sup>
Western Larch	240 max.	6 <sup>(3)</sup>
Ponderosa Pine	240 max.	4 or 6 <sup>(4)</sup>

- (1) Pole classes nominally less than 37.5 inches circumference at 6 feet from butt.
- (2) Pole classes nominally 37.5 inches or larger in circumference at 6 feet from butt.
- (3) Poles to be treated with ACA or ACZA waterborne preservatives and in accordance with provisions of paragraph 4.2.1 Appendix A.
- (4) See Appendix A, paragraph 4.2.1 for specific limitations.

\*\*Initial treatment steaming time plus any re-treatment steaming time, combined, shall not exceed these maximums.

**8.2 Treatment (Pressure Process):** All species of poles listed below:

All poles treated by this process shall be treated in a cycle in which the temperatures and pressures shown are not exceeded. These pressures and temperatures shall be recorded on a recording chart and shall be verified by visual observations of the direct reading gauges, at least hourly throughout the treating cycle by a qualified representative of the treating plant and independent inspector.

	Preservative Temperature			Impregnation Pressure lb/in <sup>2</sup>
	Deg. F			
	<u>Creo.&amp; Oilborne</u>	<u>ACA/ACZA</u>	<u>CCA</u>	
Western Red Cedar	200	150	120	100
Alaska Yellow Cedar	210	150	120	150
Jack & Red Pine	210	150	120	150
Lodgepole Pine	210	150	120	150
Douglas-fir (coast)				
& Western Larch	210	150	---	150
Southern Pine	210	150	120	200
Ponderosa (Western)				
Pine	210	150	120	200

All poles treated with waterborne preservatives (paragraph 7.4) shall be by full cell process as described in AWP Standards C1 and C4 except as modified by the provisions of ANSI 05.1-1987.

**8.3 Treatment (Thermal Process), Full-Length Treatment:** Western larch, western red cedar, Alaska yellow cedar, lodgepole pine, northern white cedar poles may be treated by the thermal process:

**8.3.1** All poles treated by this process shall be adequately seasoned by natural and artificial methods prior to treatment so that specification requirements for penetration and retention are met.

**8.3.2** The temperature of the preservative during the hot oil phase shall not exceed 235°F.

**8.4 Results of Treatment:**

**8.4.1** Penetration and retention of preservative shall be tested on borings taken at any point on the pole periphery approximately:

- a. Six inches to 12 inches above nominal ground line of western red cedar, northern white cedar, and western larch poles.
- b. Within the zone 1 foot above to 1 foot below the brand on all other species of poles.

**8.4.2** Retention of preservative shall be no less than that specified in Table 10, as determined by:

- a. Creosote by AWP Standard A6.
- b. Penta by AWP Standard A5 or A9. Copper pyridine method is required when timber may have been in contact with salt water, and for all species native to the Pacific coast region, unless the raw material invoice specifically states that the material has not been in contact with salt water or has been shown by analysis to have contained no additional chlorides in the wood before treating.
- c. Copper Naphthenate by AWP Standards A5, A9, or A11.
- d. Waterborne preservatives by tests in accordance with the recognized standards methods for chromium, copper, zinc, and arsenic ions listed in AWP Standards A2, A7, A9, or A11.

**8.4.3** Penetration of preservative, as determined in accordance with AWP Standard A3, shall not be less than that specified in Table 10. Chrome Azurol S and Penta-Check shall be used to determine penetration of copper containing preservatives and penta, respectively. Under the Independent Inspection Plan, all treating charges shall be tested for penetration using the following sampling. Under the Insured Warranty and Quality Assurance Plans, the frequency for testing penetration of charges may vary according to the plan. When testing, the sampling shall be as follows:

**8.4.3.1** For poles with a circumference of less than 37.5 inches at 6 feet from butt:

- a. Bore 20 percent of poles in a charge or 20 poles from charge, whichever is greater. Accept if 100 percent conform; otherwise, bore all poles.
- b. Re-treat the charge if more than 15 percent of the borings are found to be nonconforming.
- c. Re-treat all nonconforming poles found in the penetration sampling.
- d. Re-treated poles shall be 100 percent tested for penetration boring. Poles which are still nonconforming after the second re-treatment shall be permanently rejected. Permanently rejected poles shall have their brands removed.

**8.4.3.2** For poles with a circumference of 37.5 inches or more at 6 feet from the butt:



- a. Forty-five feet and shorter: Bore each pole and re-treat only those found to be nonconforming unless more than 15 percent fail, in which case the entire lot shall be re-treated.
- b. Fifty feet and longer: Bore each pole twice at 90 degrees apart approximately in the same plane around the pole. Accept only those poles conforming to the penetration requirement in both borings.
- c. Nonconforming poles shall be re-treated and 100 percent retested for penetration. Poles which are still nonconforming after a second re-treatment shall be permanently rejected. Permanently rejected poles shall have their brands removed.
- d. Penetration depth shall be measured along a boring from the outer end toward the inner end for a distance throughout which there is continuous preservative penetration, as indicated by evidence of preservative in each annual ring included.
- e. When poles which have been deep incised or radial drilled are bored for penetration and retention testing, the borings shall be taken midway on a diagonal between an incision or hole and an incision or hole in the next vertical row above or below.

**8.5 Re-treatment:** Poles may be retreated only twice.

**8.5.1 Creosote, Penta, and Copper Naphthenate:** Total steaming time, both for initial treatment and re-treatment, are cumulative and shall not exceed the limits for steam found in paragraph 8.1.2.1.

Re-treatment of reserve treated stock poles shall be by submersion in preservative for not less than 10 minutes under 25 pounds per square inch gauge pressure or not less than 30 minutes at atmospheric pressure.

**8.5.2 Waterborne Preservatives:** Poles which require re-treatment shall be air dried sufficiently to accept re-treatment. Re-treatment shall be within original treatment limitations. Re-treated poles shall conform fully to all the requirements of this specification; otherwise, they shall be permanently rejected.

Re-treated poles shall have a letter "R" die-stamped, hammer-stamped or burnbranded in the sawed butt surface following the charge number to indicate that the poles have been re-treated. (See paragraph 9.5 in Appendix A for branding information.)

**9. DRAWINGS:** The attached drawing (M-20) shows in detail the standard framing (gains and bolt holes) for electric distribution poles ordered under this specification. Other distribution pole framings are shown in REA Specifications and Drawings For 14.4/24.9 kV Line Construction or Specifications and Drawing For 7.2/12.5 kV Line Construction. Framing drawings for electric transmission poles are shown in REA Electric Transmission Specifications and Drawings. Pole stub and anchor log dimensions are shown in the above specifications and drawings or Tables 11, 12 and 13 of this section. The appropriate framing drawings shall be designated and provided by the purchaser.

**10. DESTINATION INSPECTION:** The detailed requirements cited in this specification shall be adhered to for all materials shipped to purchasers.

The purchaser shall have the prerogative to inspect materials at destination. All provisions of this specification shall apply to material inspected at destination except preservative retention (see paragraph 3.4).

Judgment, although used by quality control personnel and independent inspectors, shall not be the basis for acceptance of material which does not conform to the minimum requirements of this specification. Where a difference of opinion arises as to the compliance of materials with this specification, when inspected at destination, it shall be the responsibility of the supplier to attempt to resolve this matter with the purchaser.

**11. PURCHASE OF RELATED SPECIFICATIONS AND STANDARDS:**

All ANSI standards may be purchased from:

American National Standards Institute, Inc.  
1430 Broadway  
New York, New York 10018  
Telephone: (212) 354-3300

All AWP standards may be purchased from:

American Wood-Preservers' Association (AWPA)  
P. O. Box 286  
Woodstock, Maryland 21163-0286  
Telephone: (410) 465-3169

Standard Grading Rules for Southern Pine Lumber may be purchased from:

Southern Pine Inspection Bureau  
4709 Scenic Highway  
Pensacola, Florida 32504  
Telephone: (904) 434-2611

Standard Grading Rules for West Coast Lumber may be purchased from:

West Coast Lumber Inspection Bureau  
P.O. Box 23145  
Portland, Oregon 97223  
Telephone: (503) 639-0651

APPENDIX AMaterial Requirements**1. SCOPE**

The material in Appendix A is reprinted primarily from the American National Standards Institute (ANSI) Standard 05.1-1987, "American National Standard Specifications and Dimensions for Wood Poles." This material is reprinted by permission from ANSI. Copies of ANSI 05.1-1987 may be purchased from the American National Standards Institute, 1430 Broadway, New York, New York 10018.

**2. DEFINITIONS**

The following definitions shall apply to the terms used in this standard:

Air Seasoning: Drying by the use of air where the air temperature is not more than 140°F either in the open or under cover.

Boulton Drying: Drying by heating in nonaqueous solution under vacuum.

Check: The lengthwise separation of the wood that usually extends across the rings of annual growth and commonly results from stresses set up in wood during seasoning.

Compression Wood: Abnormal wood formed on the lower side of branches and inclined trunks of softwood trees. Compression wood is identified by its relatively wide annual rings, usually eccentric; relatively large amount of summerwood, sometimes more than 50 percent of the width of the annual rings in which it occurs; and its lack of demarcation between springwood and summerwood in the same annual rings. Compression wood, compared with normal wood, shrinks excessively lengthwise.

Cross Break: A separation of the wood cells across the grain. Such breaks may be due to internal strains resulting from unequal longitudinal shrinkage or to external forces.

Dead Streak: An area, devoid of bark, resulting from progressive destruction of the growth cells of wood and bark at the edges of the streak. On a pole, a dead streak is characterized by a discolored weathered appearance and by lack of evidence of overgrowth along the edges of the deadened surface.

Decay: The decomposition of wood substance by fungi.



Decay, Advanced (or Typical): The older stage of decay in which the destruction is readily recognized because the wood has become punky, soft and spongy, stringy, ring-shaked, pitted, crumbly, or, in poles not stored or rafted in water, is in a soggy condition. Decided discoloration or bleaching of the rotted wood is often apparent.

Decay, Incipient: The early stage of decay that has not proceeded far enough to soften or otherwise perceptibly impair the hardness of the wood. It is usually accompanied by a slight discoloration or bleaching of the wood.

Decayed Knot: A knot containing decay. Two types of decayed knot are recognized.

Type I - Knots containing soft or loose fibers (decay) which may extend the full length of the knot into the pole and which are associated with heart rot.

Type II - Knots containing soft or loose fibers (decay) which are not associated with heart rot.

Face of Pole: The concave side of greatest curvature in poles with sweep in one plane and one direction, or the side of greatest curvature between groundline and top in poles having reverse or double sweep.

Ground Line Section: That portion of a pole between 1 foot above and 2 feet below the ground line, as defined in the pole dimension tables (see Tables 3 through 9). (For purposes of defining the ground line when incising or radial drilling, see paragraphs 9.7.1 and 9.7.2.)

Hollow Heart: A void in the heartwood caused by decay or insect attack.

Hollow Pith Center: A small hole at the pith center of the trunk or of a knot caused by disintegration of the pith (small soft core occurring in the structural center of a tree or branch).

Insect Damage: Damage resulting from the boring into the pole by insects or insect larvae. Scoring or channeling of the pole surface is not classed as insect damage.

Kiln Drying: Drying by the use of heated air in batch or progressive-type kilns.

Knot Cluster: Two or more knots grouped together as a unit, the fibers of the wood being deflected around the entire unit; distinct from the group of single knots in which each is a unit. A knot cluster shall be considered as a single knot.

Knot Diameter: The diameter of a knot on the surface of the pole measured in a direction at right angles to the lengthwise axis of



the pole. The sapwood as well as the heartwood portion of a knot shall be included in the measurement.

NOTE: For a description of means for defining the limits of knots, see American National Standard Definitions of Terms Relating to Timber, ANSI/ASTM D9-87.

Lot: A quantity of poles of like size, conditioning, and fabrication usually making up one treating charge.

Red Heart: A condition caused by a fungus, *Fomes pini*, that occurs in the living tree. It is characterized in the early stages of infection by a reddish or brownish color in the heartwood; known as "firm red heart." Later the wood of the living tree disintegrates (decays) in small, usually distinct, areas that develop into whiteline pockets.

Sap Stain: A discoloration of the sapwood, caused by the action of certain molds and fungi, that is not accompanied by softening or other disintegration of the wood.

Scar: A depression in the surface of the pole resulting from a wound where the living tree has not compartmentalized the wound and reestablished the normal cross section of the pole.

Scar, Turpentine Acid Face: An area in the lower portion of a southern pine pole where bark hack removal with acid applied has caused resin to flow. No removal of sapwood has occurred.

Scar, Turpentine Cat Face: A depression in the surface of a southern pine pole resulting from a wood hack into the sapwood, where the tree has not compartmentalized the wound and reestablished the normal cross section of the pole.

Shake: A separation along the grain, the greater part of which occurs between the rings of annual growth.

Short Crook: A localized deviation from straightness which, within any section 5 feet or less in length, is more than 1/2 the mean diameter of the crooked section (see Fig. 1, Diagram 3).

Spiral-Grained (Twist-Grained) Wood: Wood in which the fibers take a spiral course about the trunk of a tree instead of a vertical course. The spiral may extend in a right-hand or left-hand direction around the tree trunk. Spiral grain is a form of cross grain.

Split: A lengthwise separation of the wood extending completely through the piece from one surface to another.

Steam Conditioning: Subjecting poles in a closed vessel to steam prior to treatment.

Sweep: Deviation of a pole from straightness (see Fig. 1, Diagrams 1 and 2, Exhibit A).

### 3. POLE CLASSES

Poles meeting the requirements of this standard are grouped in the classes identified in Tables 3 through 9, based on their circumference measured 6 feet from the butt. Poles of a given class and length are designed to have approximately the same load carrying capacity regardless of species.

### 4. MATERIAL REQUIREMENTS: GENERAL

#### 4.1. Species.

4.1.1 Poles: See Table 1, Appendix A.

4.1.2 Telephone Pedestal Stubs.

4.1.2.1 All round pedestal stubs shall conform to material requirements for poles. Plywood peeler cores, and similar material where the sapwood has been largely removed, are not acceptable.

4.1.2.2 All sawn stubs shall conform to the following material requirements:

All sawn stubs furnished under this specification shall be free of brashy wood, cross breaks, decay, insect holes larger than 3/32 of an inch, and dried to a moisture content of not more than 19 percent. The stubs shall be surfaced on four sides, shall meet additional requirements as shown on specification drawings, and shall be made of one of the following:

Douglas-fir conforming to provisions of No. 1 "Structural Joists and Planking," as per paragraph 123b, of Rule 16 of the Standard Grading Rules for West Coast Lumber (WCLIB Number 16-revised 1991). All references to Douglas-fir shall be that of coastal origin.

Southern Yellow Pine conforming to the provision of No. 1 "Structural Joist and Planks" as per paragraph 312 of the 1991 Southern Pine Inspection Bureau (SPIB) Grading Rules except for the applicable overriding provisions of the REA specification.

Other Species acceptable for pedestal stubs under this specification, shall be equivalent in grade to those specified in paragraph 4.1.2.2 of this section.

#### 4.2 Conditioning, Seasoning, and Treatment Limitations:

**4.2.1 Air Seasoning:** Air seasoning shall be in conformance with this specification for preservative treatment without developing pretreatment decay. Presteamng or after steaming is permitted for species in Treatment Group A. However, if such steaming is employed, the maximum temperature shall not exceed 240°F. The total steaming time from the time steam is introduced into the cylinder, including both initial and final steam, shall not exceed 4 hours duration (see exception for Douglas-fir (coast) and western larch in paragraph 4.2.5). Up to 6 hours steam at temperatures up to 240°F may be employed for ponderosa pine poles, provided that when steaming commences the moisture content (calibrated to the basis of oven dry weight moisture content) measured with a resistance-type moisture meter with insulated pins is not over 25 percent at 2.5 inches from the surface at midlength. Otherwise, the maximum steaming time for ponderosa pine poles is 4 hours.

All air seasoned poles shall be conditioned prior to or during treatment so that the pith center of the pole shall have been heated for at least 2 hours at a temperature of not less than 150°F. (Heat transfer usually requires 1 hour for each inch of diameter at 150°F.)

Poles to be salt treated which have not been conditioned as stated above shall be kiln dried prior to treatment. Kiln-dried poles shall be treated within 1 month from the time they are removed from the kiln.

Pedestal stubs which are air-seasoned shall have been dried by natural air circulation. They shall be checked by the heartwood. The moisture content shall not exceed 25 percent at a depth of 1 1/2 inches or at the sapwood heartwood line, whichever is less. All sawn pedestal stubs shall be dried to a moisture content of not more than 19 percent prior to treatment.

**4.2.2 Boulton Drying Temperature:** The temperature employed in Boulton drying poles of species listed under Treatment Group B of Table 1 shall not exceed 220°F. These poles may be steamed up to 240°F for a maximum time of 4 hours, but such steaming shall be limited to steaming after treatment.

**4.2.3 Kiln Drying:** Where kiln drying is employed on southern pine, ponderosa pine, red pine, jack pine, lodgepole pine, Douglas-fir (coast), and western larch, the maximum dry bulb temperature shall be increased gradually and shall not exceed 170°F (with the exception noted below). Where kiln drying is employed on western red cedar, the maximum dry bulb temperature shall be increased gradually and shall not exceed 160°F. In compartment kilns operating at temperatures up to 170°F, the maximum wet bulb depressions shall not exceed 50°F with the exception that during the first 24 hours there is no limitation on wet bulb depression. In progressive-type kilns operating at



temperatures up to 170°F, the maximum wet bulb depression shall not exceed 50°F in the body of the kiln and 90°F at the entrance to the kiln.

Exception: Drying over 170°F is permitted for southern pine, lodgepole pine, Douglas-fir (coast), and western larch species. The maximum dry bulb temperature shall not exceed 230°F for these species. For dry bulb temperatures over 200°F, the wet bulb depression shall be not less than 50°F with the exception that during the first 24 hours there is no limitation on wet bulb depression.

**4.2.4 Steam Conditioning:** The steam temperature employed in steam conditioning for poles of species in Treatment Group C of Table 1 shall not exceed 245°F. The time duration for poles with specified circumferences 37.5 inches or less at 6 feet from the butt shall not exceed 17 hours. Poles with specified circumferences larger than 37.5 inches at 6 feet from the butt shall not exceed 20 hours.

**4.2.5 Steaming (Douglas-fir (coast) and Western Larch):** Douglas-fir (coast) and western larch poles which are to be treated with waterborne preservatives and which have not been Boulton dried may be steamed at a maximum temperature of 240°F. For poles in this category, the maximum duration starting with the time steam is introduced into the cylinder, including both initial and final steam, shall not exceed eight hours provided each pole before steaming has a maximum moisture content not exceeding 25 percent when measured with a resistance type moisture meter with insulated pins at 2.0 inches from the surface at mid-height.

**4.3 Solvent Recovery:** When poles of any species have been treated with a system using an organic solvent-based preservative solution, a solvent recovery cycle of not over 15 hours at a maximum temperature of 225°F is permitted provided each pole before treatment has a maximum moisture content of 25 percent when measured with a resistance-type moisture meter (calibrated to the basis of oven dry weight moisture content) with insulated pins at 2 inches from the surface at mid-height.

**4.4 Rate of Growth:** The average rate of growth measured on the sawed butt surface in the outer 2 inches of poles having a circumference of 37.5 inches or less at 6 feet from the butt, and in the outer 3 inches of poles having a circumference of more than 37.5 inches at 6 feet from the butt, shall not be less than six rings per inch. Exception: Poles with four and five rings per inch are acceptable if 50 percent or more summerwood is present.

As an alternative, the ring count and summerwood measurements mentioned above may be made on an increment core taken at 6 feet from the butt directly above the place where the average rate of growth is indicated on the butt surface.

## 5. MATERIAL REQUIREMENTS: PROHIBITED DEFECTS

### 5.1 Cross breaks (cracks).

5.2 Decay, except as permitted for firm red heart in 6.1, defective butts in 7.4 and decayed knots in 7.6. When conditions indicate on distribution poles and transmission poles (in the white), a boring to the center of the pole shall be taken at approximately 1 foot above the ground line, at midpoint, near (within 2 inches) a check or at any other suspicious area. The borings shall be examined by the quality control supervisor and the inspector for any signs of decay.

Where a question of possible decay and infection remains, the pole shall be further tested using techniques such as the culturing or microscopic examination. Evidence of fungal fruiting bodies and mycelium on or in a piece of wood shall be considered as evidence of decay and the piece of wood shall be permanently rejected as nonconforming.

### 5.3 Dead streaks, except as permitted in 7.3.

5.4 Holes, other than drilled holes provided for in the specification, open or plugged, except holes for test purposes, which shall be plugged with treated plugs.

5.5 Hollow butts or tops, except as permitted under hollow pith centers and defective butts.

### 5.6 Marine borer damage.

5.7 Nails, spikes and other metal not specifically authorized by the purchaser.

## 6. MATERIAL REQUIREMENTS: PERMITTED DEFECTS

6.1 Firm Red Heart: Firm red heart not accompanied by softening or other disintegration (decay) of the wood is permitted.

6.2 Hollow Pith Centers: Hollow pith centers in tops or butts and in knots are permitted in poles that are to be given full-length treatment.

6.3 Sap Stain: Sap stain that is not accompanied by softening or other disintegration (decay) of the wood is permitted.

6.4 Scars: Turpentine acid face scars are permitted anywhere on the pole surface.

## 7. MATERIAL REQUIREMENTS: LIMITED DEFECTS

**7.1 Bark Inclusions:** Depressions containing bark inclusions shall not be more than 2 inches in depth, measured from the surface of the pole.

**7.2 Compression Wood:** The outer 1 inch of all poles shall be free from compression wood visible on either end.

**7.3 Dead Streaks:** A single, sound dead streak is permitted in western red cedar and northern white cedar, provided the greatest width of the streak is less than 1/4 of the circumference of the pole at the point of measurement.

**7.4 Defective Butts:** Hollowing in the butt caused by "splinter pulling" in felling the tree is permitted, provided that the area of such a hollow is less than 10 percent of the butt area. Hollow heart or decay, or both, is permitted in cedar poles only, provided the aggregate area of the hollow heart or decay, or both, does not exceed 10 percent of the entire butt area and does not occur closer than 2 inches to the side surface and provided that the depth of the hollow does not exceed 2 feet, measured from the butt surface.

**7.5 Insect Damage:** Insect damage, consisting of holes 1/16 inch or less in diameter, or surface scoring or channeling is permitted. All other forms of insect damage are prohibited, except those associated with hollow heart in cedar poles.

**7.6 Knot:** The diameter of any single knot and the sum of knot diameters in any 1-foot section shall not exceed the limits of Table 2.

In determining the sum of knot diameters in any 1-foot section, only those knots with diameters over 0.5 inch whose pitch centers fall within the section shall be included in the sum, and the 1-foot section shall be located so as to include the maximum number of knots, i.e., the most severe condition. Type II "decayed knots" are permitted.



TABLE 2\*\*  
LIMITS OF KNOT SIZES

<u>Length of Pole</u>	<u>Diameter of any Single Knot (Inches) Classes</u>		<u>Maximum Sizes Permitted</u>
	<u>H6 to 3</u>	<u>(Inches) Classes 4 to 10</u>	<u>Sum of Diameters of All Knots Greater Than 0.5 Inch in Any 1-Foot Section (Inches)</u>
45 feet and shorter			
Lower half of length	3	2	1/3 of the average circumference of the same 1' section or 8", whichever is greater, but not to exceed 12"*
Upper half of length	5	4	
50 feet and longer			
Lower half of length	4	4	1/3 of the average circumference of the same 1' section or 10", whichever is greater, but not to exceed 14"*
Upper half of length	6	6	

\*Both upper and lower halves.

\*\*Table 2 precedes Table 1

NOTE: See section 3 and Tables 3 through 9 for pole classes.

**7.7 Scars (Cat Face):** A scar is the result of injury to the living tree which has begun to compartmentalize and contain the injury. This provision does not refer to damage done to the tree (pole) after it has been cut. No pole shall have a scar or turpentine cat face (southern pine) located within 2 feet of the ground line. Turpentine scars need be trimmed only to the extent necessary for examination for evidence of fungus infection and insect damage. Other sound scars are permitted elsewhere on the pole surface, provided they are smoothly trimmed and do not interfere with the cutting of any gain and provided that:

(1) The circumference at any point on trimmed surfaces located between the butt and 2 feet below the ground line is not less than the minimum circumference specified at 6 feet from the butt for the class and length of the pole; and

(2) The depth of the trimmed scar is not more than 2 inches, if the diameter is 10 inches or less, or 1/5 the pole diameter at the location of the scar if the diameter is more than 10 inches.

**7.8 Shakes:** Shakes in the butt surface which are not closer than 2 inches to the side surface of the pole are permitted, provided they do not extend to the ground line. Shakes or a combination of connected shakes which are closer than 2 inches to the side surface of the pole are permitted, provided they do not extend further than 2 feet from the butt surface and do not have an opening wider than  $1/8$  inch. Shakes in the top surface are permitted in poles that are to be given full-length preservative treatment, provided that the diameter of the shake is not greater than  $1/2$  the diameter of the top of the pole and is not closer than 2 inches from the surface.

**7.9 Shape:** Poles shall be free from short crooks. A pole may have sweep subject to the following limitations:

(1) Where sweep is in one plane and one direction only:

(a) For poles 50 feet and shorter of all species except northern white cedar, a straight line joining the surface of the pole at the ground line and the edge of the pole at the top shall not be distant from the surface of the pole at any point by more than 1 inch for each 10 feet of length between these points in 90 percent or more of an inspection lot. In the remainder of the inspection lot (10 percent), the poles may have a deviation of one inch for each 6 feet of length when measured as above.

(b) Poles 55 feet and longer shall meet the 1-inch-in-10-feet requirement in 75 percent or more of an inspection lot. In the remainder of the lot (25 percent), the poles may have a deviation of 1 inch for each 6 feet of length when measured as above. The deviation for all northern white cedar poles in an inspection lot shall not be more than 1 inch for each 4 feet of length as measured above (see figure 1, diagram 1).

(2) Where sweep is in two planes (double sweep), except in northern white cedar poles, or in two directions in one plane (reverse sweep), a straight line connecting the midpoint at the ground line with the midpoint at the top shall not at any intermediate point pass through the surface of the pole (see figure 1, diagram 2). The double sweep limitation for northern white cedar poles shall be as follows: Where sweep is in two planes (double sweep), the sum of the sweeps in the two planes (each sweep being measured as shown in figure 1, diagram 1) shall not be greater than the allowance for sweep in one plane and one direction for a pole of the same length.



**7.10 Spiral Grain:** Spiral grain (twist grain) is permitted as follows:

<u>Length of Pole (Feet)</u>	<u>Maximum Twist of Grain Permitted</u>
30 and shorter	1 complete twist in any 10 ft.
35-45, inclusive	1 complete twist in any 16 ft.
50 and longer	1 complete twist in any 20 ft.

### **7.11 Splits and Checks.**

**7.11.1 In the Top:** A split or a combination of two single checks (each check terminating at the pith center and separated by not less than 1/6 of the circumference) having one or both portions located in a vertical plane within 30 degrees of the top bolt hole shall not extend downward along the pole more than 6 inches. All other combinations of checks or a split shall not extend downward along the pole more than 12 inches. (Two checks of approximately the same width, each check terminating at the pith center and separated by 1/2 inch or less of wood fiber at any point on the pole circumference, shall be considered as a single continuous check.)

**7.11.2 In the Butt:** A split or a combination of two single checks, as defined in 7.11.1, in its entirety, shall not extend upward along the pole more than 2 feet.

## **8. DIMENSIONS**

For dimensions of particular species of poles, see Tables 3 through 9, Exhibits B to G. For dimensions of stubs and anchor logs, see Tables 11, 12, and 13 respectively, Exhibits I and J.

**8.1 Length:** Poles less than 50 feet in length shall not be more than 3 inches shorter or 6 inches longer than nominal length. Poles 50 feet or more in length shall not be more than 6 inches shorter or 12 inches longer than nominal length.

Length shall be measured between the extreme ends of the pole.

**8.2 Circumference:** The minimum circumferences at 6 feet from the butt and at the top, for each length and class of pole, are listed in Tables 3 through 9. The circumference at 6 feet from the butt of a pole shall not be more than 7 inches or 20 percent larger than specified minimum, whichever is greater.

The top dimensional requirement shall apply at a point corresponding to the minimum length permitted for the pole.

**8.3 Classification:** The true circumference class shall be determined as follows: Measure the circumference at 6 feet from the butt. This dimension shall determine the true class of the pole, provided that its top (measured at the minimum length point) is large enough. Otherwise, the circumference at the top

shall determine the true class, provided that the circumference at 6 feet from the butt does not exceed the specified minimum by more than 7 inches or 20 percent, whichever is greater.

## 9. MANUFACTURING REQUIREMENTS

**9.1 Bark Removal:** Outer bark shall be completely removed from all poles.

On all poles, no patch of inner bark more than 1 inch wide shall be left on the pole surface between the butt and 2 feet below the ground line.

On poles that are to be given full-length treatment, no patch of inner bark larger than 1 inch wide and 6 inches long shall be left on the pole surface between the top and 2 feet (below the ground line).

**NOTE:** These provisions are intended to allow an occasional patch of bark and shall not be interpreted to allow numerous patches of bark.

**9.2 Sawing:** All poles shall be neatly sawed at the top and at the butt along a plane which shall not be out of square with the axis of the pole by more than 2 inches per foot of diameter of the sawed surface. Beveling at the edge of the sawed butt surface not more than 1/12 the butt diameter in width, or an equivalent area unsymmetrically located, is permitted. The sawed surface shall be smooth enough to allow the inspector's mark to be clear and legible after treatment.

**9.3 Trimming:** Completely overgrown knots, rising more than 1 inch above the pole surface, branch stubs, and partially overgrown knots shall be closely trimmed. Completely overgrown knots less than 1 inch high need not be trimmed. Trimming may be done by shaving machine or by hand.

**9.4 Shaving:** If shaving is used, the depth of cut shall not be more than necessary to remove inner bark and to trim smoothly and closely all branch stubs and overgrown knots. There shall be no abrupt change in the contour of the pole surface between the ground line and the aboveground sections. The lower 2 feet of poles may be trimmed to remove wood fibers causing butt flare, provided sufficient sapwood remains to obtain customer's minimum penetration requirement.

**9.5 Marking and Code Letters:** The information in items (1) through (5) below shall be burnbranded legibly and permanently on the pole face or included on a metal tag affixed thereto. The metal tag for the face of the pole shall be round, noncorrosive, tight-fitting and recessed 1/4 inch. It shall be fastened with a barbed or serrated noncorrosive nail. The information in items (5) and (6) below shall be placed on the sawed butt surface. If

so desired by the producer or the purchaser, items (1), (3), and (4) below may also be placed on the sawed butt surface.

- (1) The supplier's code or trademark.
- (2) Insured warranty or quality assurance mark, if applicable.
- (3) Plant location and month and year of treatment.
- (4) Code letters denoting the pole species, preservative, and required retention.
- (5) The true circumference-class numeral and numerals showing the length of the pole.
- (6) The charge number. (An "R" shall also be die-stamped, hammer-stamped or burnbranded in the sawed butt surface of re-treated poles.)

The code letters, not less than 5/8-inch high if burnbranded, and not less than 1/8-inch high if on a metal tag, designating the pole species and preservative used, shall be as follows:

<u>Pole Species</u>	<u>Code Letters</u>
Cedar	
Alaska yellow	YC
Northern white (eastern)	EC
Western red	WC
Douglas-fir (coast)	DF
Larch (western)	WL
Pine	
Jack	JP
Lodgepole	LP
Ponderosa	WP
Red (Norway)	NP
Southern	SP
Loblolly	
Longleaf	
Shortleaf	
Slash	



<u>Preservatives</u>	<u>Code Letters</u>
Creosote	C
Pentachlorophenol-Petroleum (Heavy Solvent)	PA
Ammoniacal Copper Arsenate	SB
Ammoniacal Copper Zinc Arsenate	SZ
Chromated Copper Arsenate	
Type A	SC
Type B	SJ
Type C	SK
Copper Naphthenate	N

For poles, the bottom of the brand or mark shall be placed squarely on the face of the pole and at 10 feet  $\pm$  2 inches from the butt of poles 50 feet or less in length and at 14 feet  $\pm$  2 inches from the butt of poles 55 feet or more in length or as otherwise specified in the purchase order. Anchor logs shall have the brand or mark at the midpoint and the designation for length and diameter (as prescribed in Table 12) on an end. For pedestal stubs the brand shall be placed 5 feet  $\pm$  2 inches from the butt or end.

<u>Example</u>	<u>Interpretation</u>
HRL	Supplier's Code or Trademark (for example, Harry Roberts' Lumber Company)
IW	Insured Warranty or Quality Assurance Mark, if applicable
S5-74	Plant Location (for example, Syracuse) Month and Year of Treatment (for example, May 1974)
SPC-9	Species and Preservative (for example, southern pine, creosote) Retention (actual retention required by this specification)
5-35	Size (for example, Class 5-35 foot pole) or Designation

## 9.6 Framing:

9.6.1 All distribution poles and stubs shall be bored, gained, and cut to length prior to final treatment.

9.6.2 Transmission poles may be bored and gained after treatment, provided that the cut surfaces are subsequently pressure treated or treated with a supplemental groundline type preservative.

9.6.3 All framing shall be in accordance with the attached drawings or with the drawings which accompany the order. Anchor logs shall be bored as required by the order for them.

9.6.4 When gains are required on one side only, they shall be cut on the face of the pole, and the gained surfaces shall be in approximately parallel planes. Transmission poles (e.g., poles 50 feet or longer) may be treated undrilled.

9.6.5 Transmission poles may be bored before treatment for fumigation if designated in the purchase order.

9.6.6 Bolt holes in poles treated with waterborne preservatives shall be drilled to the maximum dimension permitted by the REA standard drawings (i.e., 1/16 inch over the nominal size).

9.6.7 Anchor logs shall be bored as required by the order for them.

#### 9.7 Incising.

9.7.1 Distribution Poles: Western red cedar and northern white cedar distribution poles to be treated by the thermal process shall be ground line incised in the area 2 feet above and 4 feet below the designated ground line with a pattern and depth sufficient to insure uniform penetration of the total sapwood in the incised area.

9.7.2 Transmission Poles: Western red cedar and northern white cedar transmission poles to be treated by the thermal process shall be ground line incised in the area 2 feet above and 4 feet below the designated ground line, with a pattern and depth sufficient to insure uniform penetration of the total sapwood in the incised area. All Douglas-fir (coast) transmission poles (poles 50 feet or longer) shall be deep-incised or radial drilled to a minimum depth of 2 1/2 inches in the area 2 feet above and 4 feet below the designated ground line. When indicated by experience, a deeper penetration may be specified by the purchaser as shown in the table below:

50 thru 65 feet	4.0 inches
70 thru 85 feet	4.5 inches
90 feet or longer	5.0 inches

Deep incising or radial drilling shall be, as minimum spacing, a 3x6-inch vertical diamond pattern. Radial-drilled holes shall not exceed 5/16 inch in diameter.

**9.7.3 Incising or Drilling:** Incising or drilling shall be cleanly done to prevent tearing or excessive shattering of fibers. Incisions shall be along (in line with) the axis of the pole.

**9.7.4 Pedestal Stubs:** Western red cedar, northern white cedar and western larch that are to be treated by thermal process shall be incised in the groundline section in accordance with AWPA Standard C8. The lengthwise surface of sawn Douglas-fir stubs shall be incised. The incisions shall be approximately 0.4 inch deep, clean-cut and the pattern shall insure uniform penetration of preservative.

## **10. STORAGE AND HANDLING**

**10.1 Storage:** When it is necessary to hold poles in storage, they shall be stacked on treated or other nondecaying skids, stickers, etc., of such dimensions, and so arranged, as to support the poles without producing noticeable distortion of any of them. The height of the poles shall be limited to avoid damage to poles on the bottom layers. All wood skids, stickers, etc., shall be treated.

Poles shall be piled and supported in such a manner that all poles are, at any point, at least 1 foot above the general ground level and any vegetation growing thereon. Stacks of poles shall not be allowed to settle at any point to less than 1 foot above the ground or any adjacent vegetation growing thereon. No decayed or decaying wood shall be permitted to remain underneath stored poles or in the yard area adjacent to the stored poles. Unseasoned poles shall not be dead piled at any time for air seasoning. This restriction does not apply to short-term piling associated with normal manufacturing procedures. Where special conditions exist, such as in arid areas, a waiver to this dead piling restriction may be requested from REA.

**10.2 Handling:** Poles shall not be dragged along the ground. Cant hooks, pole thongs, or other pointed tools shall not be applied to the ground line section of any pole.

**10.3 Mechanical Damage:** Poles are not acceptable if they contain indentations attributed to loading or handling slings that are 1/4 inch or more deep over 20 percent or more of the pole circumference, or more than 1/2 inch deep at any point. Other indentations or abrasions, for example, forklift damage, chain-saw damage, etc., shall not be more than 1/10 the pole diameter at the point of damage up to a maximum of 1 inch. Such damage is permitted in an oversized section, where the excess of wood shall be taken into consideration in evaluating the effects of the damage. In any case, the remaining circumference shall meet or exceed the specification minimum.



TABLE 1  
General Requirements

<u>Treatment Group</u>	<u>Genus Species</u>	<u>Fiber Stress (psi)</u>
Treatment Group A (air seasoned)		
Cedar, northern white (eastern)	Thuja occidentalis	4000
Cedar, western red	Thuja plicata	6000
Pine, ponderosa	Pinus ponderosa	6000
Pine, jack	Pinus banksiana	6600
Pine, lodgepole	Pinus contorta	6600
Pine, red (Norway)	Pinus resinosa	6660
Cedar, Alaska yellow	Chamaecyparis nootkatensis	7400
Treatment Group B (Boulton drying)		
Douglas-fir (coast)	Pseudotsuga menziesii	8000
Larch, western	Larix occidentalis	8400
Treatment Group C (steam conditioned)		
Pine, southern		8000
Loblolly	Pinus taeda	
Longleaf	Pinus palustris	
Shortleaf	Pinus echinata	
Slash	Pinus elliottii	
Treatment Group D (kiln drying)		
Cedar, western red	Thuja plicata	6000
Douglas-fir, (coast)	Pseudotsuga menziesii	8000
Larch, western	Larix occidentalis	8400
Pine, jack	Pinus banksiana	6600
Pine, lodgepole	Pinus contorta	6600
Pine, ponderosa	Pinus ponderosa	6000
Pine, red	Pinus resinosa	6600
Pine, southern		
Loblolly	Pinus taeda	8000
Longleaf	Pinus palustris	8000
Shortleaf	Pinus echinata	8000
Slash	Pinus elliottii	8000

DIAGRAM 1 — MEASUREMENT OF SWEEP IN ONE PLANE AND ONE DIRECTION

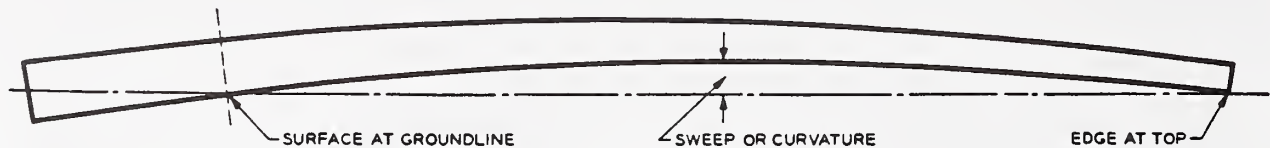
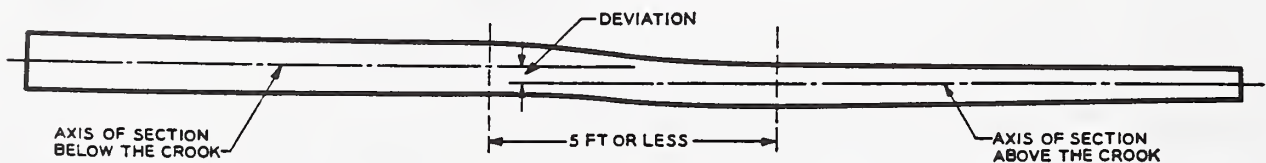


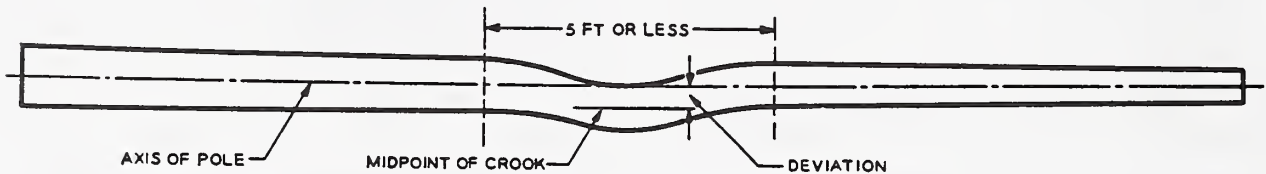
DIAGRAM 2 — MEASUREMENT OF SWEEP IN TWO PLANES (DOUBLE SWEEP)  
OR IN TWO DIRECTIONS IN ONE PLANE (REVERSE SWEEP)



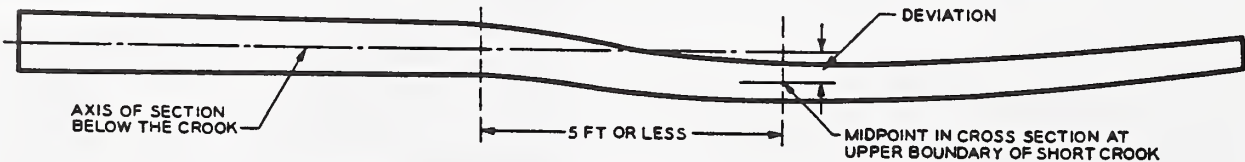
DIAGRAM 3 — MEASUREMENT OF SHORT CROOK (THREE CASES SHOWN)



CASE 1: WHERE THE REFERENCE AXES ARE APPROXIMATELY PARALLEL



CASE 2: WHERE AXES OF SECTIONS ABOVE AND BELOW THE CROOK  
COINCIDE OR ARE PRACTICALLY COINCIDENT



CASE 3: WHERE AXIS OF SECTION ABOVE SHORT CROOK IS NOT PARALLEL  
OR COINCIDENT WITH AXIS BELOW THE CROOK

NOTE: The three cases shown under Diagram 3 are typical and are intended to establish the principle of measuring short crooks. There may be other cases not exactly like those illustrated.

Figure 1 — Measurement of sweep and short crook in poles



**Table 3 – Dimensions of northern white cedar poles**

Class		1	2	3	4	5	6	7	9	10
Minimum circumference at top in		27	25	23	21	19	17	15	15	12
Length of pole ft	Groundline <sup>1)</sup> distance from butt ft	Minimum circumference at 6 ft from butt in								
20	4	38.0	35.5	33.0	30.5	28.0	26.0	24.0	22.0	17.5
25	5	42.0	39.5	36.5	34.0	31.5	29.0	27.0	24.0	19.5
30	5.5	45.5	43.0	40.0	37.0	34.5	32.0	29.5	26.0	—
35	6	49.0	46.0	42.5	39.5	37.0	34.0	31.5	—	—
40	6	51.5	48.5	45.0	42.0	39.0	36.0	—	—	—
45	6.5	54.5	51.0	47.5	44.0	41.0	—	—	—	—
50	7	57.0	53.5	49.5	46.0	43.0	—	—	—	—
55	7.5	59.0	55.5	51.5	48.0	—	—	—	—	—
60	8	61.0	57.5	53.5	50.0	—	—	—	—	—

NOTE – Classes and lengths for which circumferences at 6 feet from the butt are listed in boldface type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.

<sup>1)</sup>The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.

Table 5 – Dimensions of western red cedar<sup>1)</sup> and ponderosa pine poles

Class		H-6	H-5	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7	9	10
Minimum circumference at top in		39	37	35	33	31	29	27	25	23	21	19	17	15	15	12
Length of pole ft	Groundline <sup>2)</sup> distance from butt ft	Minimum circumference at 6 ft from butt in														
20	4	-	-	-	-	-	-	33.5	31.5	29.5	27.0	25.0	23.0	21.5	18.5	15.0
25	5	-	-	-	-	-	-	37.0	34.5	32.5	30.0	28.0	25.5	24.0	20.5	16.5
30	5.5	-	-	-	-	-	-	40.0	37.5	35.0	32.5	30.0	28.0	26.0	22.0	-
35	6	-	-	-	-	48.0	45.5	42.5	40.0	37.5	34.5	32.0	30.0	27.5	-	-
40	6	-	-	56.5	53.5	51.0	48.0	45.0	42.5	39.5	36.5	34.0	31.5	-	-	-
45	6.5	64.5	62.0	59.0	56.0	53.5	50.5	47.5	44.5	41.5	38.5	36.0	33.0	-	-	-
50	7	67.0	64.5	61.5	58.5	55.5	52.5	49.5	46.5	43.5	40.0	37.5	-	-	-	-
55	7.5	70.0	67.0	64.0	61.0	57.5	54.5	51.5	48.5	45.0	42.0	-	-	-	-	-
60	8	72.0	69.0	66.0	63.0	59.5	56.5	53.5	50.0	46.5	43.5	-	-	-	-	-
65	8.5	74.5	71.5	68.0	65.0	61.5	58.5	55.0	51.5	48.0	45.0	-	-	-	-	-
70	9	76.5	73.5	70.0	67.0	63.5	60.0	56.5	53.0	49.5	46.0	-	-	-	-	-
75	9.5	78.5	75.5	72.0	68.5	65.0	61.5	58.0	54.5	51.0	-	-	-	-	-	-
80	10	80.5	77.0	74.0	70.5	67.0	63.0	59.5	56.0	52.0	-	-	-	-	-	-
85	10.5	82.5	79.0	75.5	72.0	68.5	64.5	61.0	57.0	53.5	-	-	-	-	-	-
90	11	84.5	81.0	77.0	73.5	70.0	66.0	62.5	58.5	54.5	-	-	-	-	-	-
95	11	86.0	82.5	79.0	75.0	71.5	67.5	63.5	59.5	-	-	-	-	-	-	-
100	11	87.5	84.0	80.5	76.5	72.5	69.0	65.0	61.0	-	-	-	-	-	-	-
105	12	89.5	85.5	82.0	78.0	74.0	70.0	66.0	62.0	-	-	-	-	-	-	-
110	12	91.0	87.0	83.5	79.5	75.5	71.5	67.5	63.0	-	-	-	-	-	-	-
115	12	92.5	88.5	84.5	80.5	76.5	72.5	68.5	64.0	-	-	-	-	-	-	-
120	12	94.0	90.0	86.0	82.0	78.0	74.0	69.5	65.0	-	-	-	-	-	-	-
125	12	95.5	91.5	87.5	83.0	79.0	75.0	70.5	66.0	-	-	-	-	-	-	-

NOTE – Classes and lengths for which circumferences at 6 feet from the butt are listed in boldface type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.

<sup>1)</sup>Dimensions of H Classes are applicable for western red cedar only.

<sup>2)</sup>The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.

Table 6 – Dimensions of jack pine, lodgepole pine, red pine, redwood, sitka spruce, western fir, and white spruce poles

Class		1	2	3	4	5	6	7	9	10
Minimum circumference at top in		27	25	23	21	19	17	15	15	12
Length of pole ft	Groundline <sup>1)</sup> distance from butt ft	Minimum circumference at 6 ft from butt in								
20	4	32.5	30.5	28.5	26.5	24.5	22.5	21.0	18.0	14.5
25	5	36.0	33.5	31.0	29.0	27.0	25.0	23.0	20.0	15.5
30	5.5	39.0	36.5	34.0	31.5	29.0	27.0	25.0	21.0	—
35	6	41.5	38.5	36.0	33.5	31.0	28.5	26.5	—	—
40	6	44.0	41.0	38.0	35.5	33.0	30.5	—	—	—
45	6.5	46.0	43.0	40.0	37.0	34.5	32.0	—	—	—
50	7	48.0	45.0	42.0	39.0	36.0	—	—	—	—
55	7.5	49.5	46.5	43.5	40.5	—	—	—	—	—
60	8	51.5	48.0	45.0	42.0	—	—	—	—	—
65	8.5	53.0	49.5	46.0	43.0	—	—	—	—	—
70	9	54.5	51.0	47.5	44.5	—	—	—	—	—
75	9.5	56.0	52.5	49.0	—	—	—	—	—	—
80	10	57.5	54.0	50.5	—	—	—	—	—	—
85	10.5	58.5	55.0	51.5	—	—	—	—	—	—
90	11	60.0	56.5	52.5	—	—	—	—	—	—
95	11	61.5	57.5	—	—	—	—	—	—	—
100	11	62.5	58.5	—	—	—	—	—	—	—
105	12	63.5	60.0	—	—	—	—	—	—	—
110	12	65.0	61.0	—	—	—	—	—	—	—
115	12	66.0	62.0	—	—	—	—	—	—	—
120	12	67.0	63.0	—	—	—	—	—	—	—
125	12	68.0	64.0	—	—	—	—	—	—	—

NOTE – Classes and lengths for which circumferences at 6 feet from the butt are listed in boldface type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.

<sup>1)</sup>The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.

Table 7 – Dimensions of alaska yellow cedar and western hemlock poles

Class		H6	H5	H4	H3	H2	H1	1	2	3	4	5	6	7	9	10
Minimum circumference at top in		39	37	35	33	31	29	27	25	23	21	19	17	15	15	12
Length of pole ft	Groundline <sup>1)</sup> distance from butt ft	Minimum circumference at 6 ft from butt in														
20	4	-	-	-	-	-	-	31.5	29.5	27.5	25.5	23.5	22.0	20.0	17.5	14.0
25	5	-	-	-	-	-	-	34.5	32.5	30.0	28.0	26.0	24.0	22.0	19.5	15.0
30	5.5	-	-	-	-	-	-	37.5	35.0	32.5	30.0	28.0	26.0	24.0	20.5	-
35	6	-	-	-	-	-	42.5	40.0	37.5	35.0	32.0	30.0	27.5	25.5	-	-
40	6	-	-	-	-	45.0	47.5	45.0	39.5	37.0	34.0	31.5	29.0	25.5	-	-
45	6.5	60.0	57.5	52.5	50.0	49.5	47.0	44.0	41.5	38.5	36.0	33.0	30.5	-	-	-
50	7	62.5	60.0	57.0	54.5	51.5	49.0	46.0	43.0	40.0	37.5	34.5	-	-	-	-
55	7.5	65.0	62.0	59.5	56.5	53.5	50.5	47.5	44.5	41.5	39.0	-	-	-	-	-
60	8	67.0	64.0	61.5	58.5	55.5	52.5	49.5	46.0	43.0	40.0	-	-	-	-	-
65	8.5	69.0	66.0	63.0	60.0	57.0	54.0	51.0	47.5	44.5	41.5	-	-	-	-	-
70	9	71.0	68.0	65.0	62.0	58.5	55.5	52.5	49.0	46.0	42.5	-	-	-	-	-
75	9.5	73.0	69.5	66.5	63.5	60.0	57.0	53.5	50.5	47.0	-	-	-	-	-	-
80	10	74.5	71.5	68.0	65.0	61.5	58.5	55.0	51.5	48.5	-	-	-	-	-	-
85	10.5	76.0	73.0	70.0	66.5	63.0	59.5	56.0	53.0	49.5	-	-	-	-	-	-
90	11	78.0	74.5	71.0	68.0	64.5	61.0	57.5	54.0	50.5	-	-	-	-	-	-
95	11	79.5	76.0	72.5	69.5	66.0	62.0	58.5	55.0	-	-	-	-	-	-	-
100	11	81.0	77.5	74.0	70.5	67.0	63.5	60.0	56.0	-	-	-	-	-	-	-
105	12	82.5	79.0	75.5	72.0	68.5	64.5	61.0	57.0	-	-	-	-	-	-	-
110	12	84.0	80.5	77.0	73.0	69.5	65.5	62.0	58.0	-	-	-	-	-	-	-
115	12	85.5	81.5	78.0	74.5	70.5	67.0	63.0	59.0	-	-	-	-	-	-	-
120	12	86.5	83.0	79.5	75.5	72.0	68.0	64.0	60.0	-	-	-	-	-	-	-
125	12	88.0	84.5	80.5	76.5	73.0	69.0	65.0	61.0	-	-	-	-	-	-	-

NOTE – Classes and lengths for which circumferences at 6 feet from the butt are listed in boldface type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.

1) The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.



Table 8 - Dimensions of douglas fir (both types) and southern pine poles

Class		H-6	H-5	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7	9	10
Minimum circumference at top in		39	37	35	33	31	29	27	25	23	21	19	17	15	15	12
Length of pole ft	Groundline <sup>1)</sup> of distance from butt ft	Minimum circumference at 6 ft from butt in														
		4	5	5.5	6	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11
20		-	-	-	-	-	-	-	31.0	29.0	27.0	25.0	23.0	21.0	19.5	17.5
25		-	-	-	-	-	-	33.5	31.5	29.5	27.5	25.5	23.0	21.5	19.5	14.0
30		-	-	-	-	-	-	36.5	34.0	32.0	29.5	27.5	25.0	23.5	20.5	15.0
35		-	-	-	-	-	41.5	39.0	36.5	34.0	31.5	29.0	27.0	25.0	-	-
40		-	-	-	-	43.5	43.5	41.0	38.5	36.0	33.5	31.0	28.5	-	-	-
45		58.5	56.0	51.0	48.5	46.0	45.5	43.0	40.5	37.5	35.0	32.5	30.0	-	-	-
50		61.0	58.5	53.5	51.0	50.5	47.5	45.0	42.0	39.0	36.5	34.0	-	-	-	-
55		63.5	60.5	55.5	53.0	52.0	49.5	46.5	43.5	40.5	38.0	-	-	-	-	-
60		65.5	62.5	59.5	57.0	54.0	51.0	48.0	45.0	42.0	39.0	-	-	-	-	-
65		67.5	64.5	61.5	58.5	55.5	52.5	49.5	46.5	43.5	40.5	-	-	-	-	-
70		69.0	66.5	63.5	60.5	57.0	54.0	51.0	48.0	45.0	41.5	-	-	-	-	-
75		71.0	68.0	65.0	62.0	59.0	55.5	52.5	49.0	46.0	-	-	-	-	-	-
80		72.5	69.5	66.5	63.5	60.0	57.0	54.0	50.5	47.0	-	-	-	-	-	-
85		74.5	71.5	68.0	65.0	61.5	58.5	55.0	51.5	48.0	-	-	-	-	-	-
90		76.0	73.0	69.5	66.5	63.0	59.5	56.0	53.0	49.0	-	-	-	-	-	-
95		77.5	74.5	71.0	67.5	64.5	61.0	57.0	54.0	-	-	-	-	-	-	-
100		79.0	76.0	72.5	69.0	65.5	62.0	58.5	55.0	-	-	-	-	-	-	-
105		80.5	77.0	74.0	70.5	67.0	63.0	59.5	56.0	-	-	-	-	-	-	-
110		82.0	78.5	75.0	71.5	68.0	64.5	60.5	57.0	-	-	-	-	-	-	-
115		83.5	80.0	76.5	72.5	69.0	65.5	61.5	58.0	-	-	-	-	-	-	-
120		85.0	81.0	77.5	74.0	70.0	66.5	62.5	59.0	-	-	-	-	-	-	-
125		86.0	82.5	78.5	75.0	71.0	67.5	63.5	59.5	-	-	-	-	-	-	-

NOTE - Classes and lengths for which circumferences at 6 feet from the butt are listed in boldface type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.

<sup>1)</sup> The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.

Table 9 – Dimensions of western larch poles

Class	H-6	H-5	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7	9	10
Minimum circumference at top in	39	37	35	33	31	29	27	25	23	21	19	17	15	15	12
Length of pole ft	Groundline <sup>1)</sup> distance from butt ft	Minimum circumference at 6 ft from butt in													
20	4	-	-	-	-	-	30.0	28.5	26.5	24.5	22.5	21.0	19.0	17.0	13.5
25	5	-	-	-	-	-	33.0	31.0	29.0	26.5	24.5	23.0	21.0	18.5	14.5
30	5.5	-	-	-	-	-	35.5	33.5	31.0	29.0	26.5	24.5	23.0	19.5	-
35	6	-	-	-	-	40.5	38.0	35.5	33.0	31.0	28.5	26.5	24.5	-	-
40	6	-	-	-	43.0	43.0	40.0	37.5	35.0	32.5	30.0	28.0	-	-	-
45	6.5	-	-	48.0	45.5	45.0	42.0	39.5	37.0	34.0	31.5	29.0	-	-	-
50	7	57.5	52.5	50.0	47.5	47.0	44.0	41.0	38.5	35.5	33.0	-	-	-	-
55	7.5	60.0	55.0	52.0	49.5	48.5	45.5	42.5	40.0	37.0	-	-	-	-	-
60	8	62.0	57.0	54.0	51.5	50.0	47.0	44.0	41.0	38.5	-	-	-	-	-
65	8.5	64.5	59.0	56.0	53.0	52.0	48.5	46.0	42.5	39.5	-	-	-	-	-
70	9	66.0	60.5	57.5	55.0	53.5	50.0	47.0	44.0	41.0	-	-	-	-	-
75	9.5	68.0	62.5	59.5	56.5	54.5	51.5	48.0	45.0	-	-	-	-	-	-
80	10	70.0	64.0	61.0	58.0	56.0	52.5	49.5	46.0	-	-	-	-	-	-
85	10.5	71.5	65.5	62.5	59.0	57.5	54.0	50.5	47.0	-	-	-	-	-	-
90	11	73.0	67.0	64.0	60.5	58.5	55.0	51.5	48.5	-	-	-	-	-	-
95	11	74.5	68.5	65.0	62.0	60.0	56.5	53.0	-	-	-	-	-	-	-
100	11	76.5	70.0	66.5	63.0	61.0	57.5	54.0	-	-	-	-	-	-	-
105	12	78.0	71.0	68.0	64.5	62.5	58.5	55.0	-	-	-	-	-	-	-
110	12	79.0	72.5	69.0	65.5	63.0	59.5	56.0	-	-	-	-	-	-	-
115	12	80.5	73.5	70.0	66.5	63.5	60.0	57.0	-	-	-	-	-	-	-
120	12	82.0	75.0	71.5	68.0	64.5	61.5	58.0	-	-	-	-	-	-	-
125	12	83.0	76.0	72.5	69.0	65.5	62.5	59.5	-	-	-	-	-	-	-
		84.5	77.5	73.5	70.0	66.0	62.5	58.5	-	-	-	-	-	-	-

NOTE – Classes and lengths for which circumferences at 6 feet from the butt are listed in boldface type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.

<sup>1)</sup> The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.

TABLE 10  
Treatment and Results of Treatment

Species	Area Use <sup>A</sup>	Preservative Treatments				Assay Zone		Penetration		
		<u>Minimum Retentions*</u>				<u>Inches from Surface</u>				
		<u>Creosote</u> <sup>B</sup>	<u>Penta</u> <sup>C</sup>	<u>Waterborne</u> <sup>D</sup>	<u>Cu</u> <sup>E</sup>			Minimum (Inches)	(Inches)	% of Sapwood
PRESSURE PROCESS - FULL LENGTH TREATMENT										
Southern Pine	1	9.0	0.45	0.60	.080	0.5 to 2.0			3.5 or	90
Southern Pine	2	7.5	0.38	---	.060	0.5 to 2.0			3.0 or	90
Douglas-fir+**	1	12.0	0.60	0.60	.095	0.25 to 1.0	0.75		0.75 and	85
Douglas-fir+**	2	9.0	0.45	---	.075	0.25 to 1.0	0.75		0.75 and	85
Ponderosa Pine+	1	9.0	0.45	0.60	---	0.5 to 2.0			3.5 or	90
Ponderosa Pine+	2	7.5	0.38	---	---	0.5 to 2.0			3.0 or	90
Red Pine	2	10.5	0.53	0.60	---	0.10 to 1.6			2.5 or	85
Jack Pine	2	12.0	0.60	0.60	---	0.10 to 0.75	0.50		1.5 or	85
PRESSURE AND THERMAL PROCESS - FULL LENGTH TREATMENT										
Western Larch	2	15.0	0.75	0.60	---	0.1 to 0.6	0.50		0.5 and	85
Lodgepole Pine+	2	12.0	0.60	0.60	---	0.1 to 0.75	0.75		1.5 and	85
Alaska Yellow Cedar+	2	16.0	0.80	0.60	---	0.1 to 0.6			0.5 or	100
Western Red Cedar+	2	16.0	0.80	0.60	.120	0.1 to 0.6			0.5 or	100
Northern White Cedar	2	16.0	0.80	0.60	---	0.1 to 0.6			0.5 or	100

Note A - Use Area 1-South of the 40th parallel of north latitude and east of the 95th meridian of west longitude, including the Gulf Coast of Texas.  
Use Area 2-Elsewhere than as defined for Use Area 1.

Note B - Test By Toluene Extraction

Note C - This retention for lime ignition or x-ray spectroscopy method. Copper pyridine method, which equals 90% of lime ignition results, is required when poles may have been in contact with salt water, and for all species native to the Pacific Region, unless it specifically states on the raw material invoice that the material has not been in contact with salt water or shown by analysis that there are no additional chlorides present in the wood before treating.

Note D - Pressure Treatment Only

Note - In Decay Zone 5, shown in REA Bulletin 161-4, minimum retentions are .130 PCF for Southern Pine and .150 PCF for Douglas-fir, for all poles within 50 miles of coastal waters.

\*Minimum pounds/cubic foot (pcf) acceptable at time of shipment to user.

A reduction of 10 percent from the values shown above in any of the test zones will be acceptable at destination within 30 days from the date of delivery. In the event of rejection of any poles at destination, REA and the producers shall be promptly notified. The producer may examine the poles at destination within 2 weeks of notification.

+Species native to Pacific coast region as per Agriculture Handbook 541 (1979).

\*\*Coast Type

#### DOUGLAS-FIR TRANSMISSION POLES

DOUGLAS-FIR TRANSMISSION POLES (50' or longer) see Appendix A, paragraph 6.7. Penetration shall be to the depth of the incising or radial drilling and shall be 2.5 inches minimum. Radial drilling is recommended in areas where the maximum protection in the groundline of the pole is desired.

Retention shall be as specified in the standard assay zone.

For Douglas-fir transmission poles, a second (inner) assay zone is required as follows:

	Radial Drilling	Radial Drilling or Incising	Recommended for Deeper Radial Drilling
50' - 65'	4.0"	2.0" - 2.5"	3.5" - 4.0"
70' - 85'	4.5"	2.0" - 2.5"	4.0" - 4.5"
90' - 125'	5.0"	2.0" - 2.5"	4.5" - 5.0"

The minimum retention in the inner zone shall be at least 50 percent of the requirement for the standard assay zone.

TABLE 11 - Dimensions of Electric Stubs  
Lodgepole Pine, Red Pine, Jack Pine

<u>Length of Stub</u>	<u>Class of Stub</u>						
	<u>1</u>	<u>2</u>	<u>3</u>	4	5	6	7
	<u>Minimum Top Circumference* (inches)</u>						
10.5	37.0	34.5	32.0	29.5	27.0	25.0	22.5
11	39.5	37.5	34.0	31.5	29.5	26.5	24.0
11.5	42.0	39.0	36.0	33.5	31.0	28.5	26.0
12.5	43.5	40.5	37.5	34.5	32.0	29.5	27.0
13	45.5	42.5	39.5	36.5	33.5	31.0	28.5

Southern Pine, Douglas fir (coast) and  
Western Larch

<u>Length of Stub</u> (feet)	<u>Class of Stub</u>						
	1	2	3	4	5	6	7
	<u>Minimum Top Circumference* (inches)</u>						
10.5	36.0	33.5	31.0	28.5	26.5	24.5	22.5
11	38.0	35.5	33.0	30.0	28.0	25.5	23.5
11.5	40.0	37.5	35.0	32.0	29.5	27.0	25.0
12.5	42.0	39.5	36.5	34.0	31.0	28.5	26.5
13	43.5	40.5	37.5	35.0	32.0	29.5	27.0

\*Maximum circumference not more than these figures  
plus 4 inches.

TABLE 12 - Dimensions of Anchor Logs  
Southern Pine, Lodgepole Pine, Red Pine,  
Jack Pine, Douglas Fir (coast) and Western Larch

<u>Designation</u>	<u>F2-1</u>	<u>F2-2</u>	<u>F2-3</u>	<u>F2-4</u>	<u>TA-2L</u>	<u>TA-4L</u>
Length (feet)	4'-0"	4'-6"	5'-0"	5'-0"	5'-0"	8'-0"
Diameter (Min)	8"	9"	10"	12"	8"	8"

Boring - as ordered



TABLE 13

Telephone Stubs for Mounting Buried Plant Terminal Housings

Telephone Round Type Stubs

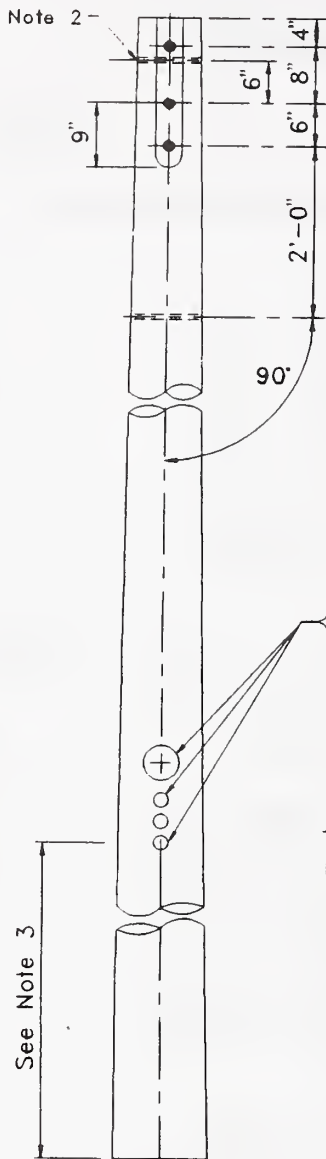
Dimensions: Top Diameter shall be 4 1/2" minimum. Butt Diameter shall be 5" minimum.

<u>Bid Limit Designation</u>	<u>Length</u>
BA-2	6.5'
BA-3	8.0'
BA-4	10.0'
BA-5	13.5'

Telephone Sawn Pedestal Stubs

Dimensions: Finished Minimum Cross-section of 3 1/2" x 4 1/2".

<u>Bid Limit Designation</u>	<u>Length</u>
BA-21	6.5'
BA-22	8.0'
BA-23	10.0'



Through-bolt holes must be parallel and in the same plane

HOLES: Drill  $1\frac{1}{16}$ " diameter

GAINS: Gains are to be flat with plane at right angles to the bolt holes

Neutral bolt hole must be at 90° angle with through-bolt holes

Supplier's code or Trademark  
Insured warranty or Quality Assurance Mark  
Plant location, month and year of treatment  
Species, preservative code and retention  
Size or designation

#### TOLERANCES

##### HOLES:

On the gain;  $\pm 1/8$ " from the centerline of the holes.

On the side opposite the gain;  $\pm 1/4$ " from the centerlines of the holes.

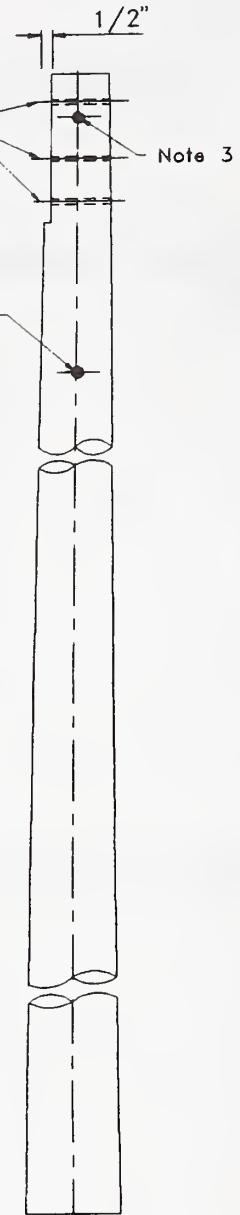
Location (measured from the roof):

Gain side  $\pm 1/4$ "

Opposite side  $\pm 1/2$ "

Diameter:  $\pm 1/16$ "

GAINS: Out of parallel  $\pm 1/2$ "



#### NOTES

1. All poles shorter than 50 feet must be bored, roofed and gained before treatment, except that Class 7 and smaller poles need not be gained unless requested by purchaser. Roofs may be flat or at a 15° angle at the producer's option.
2. Anti-split bolt hole is optional and is to be drilled only when so specified by the purchaser.
3. Bottom of brand or center of metal disk shall be  $10' \pm 2"$  from the pole butt for poles less than 55' in length;  $14' \pm 2"$  for poles 55' and longer.

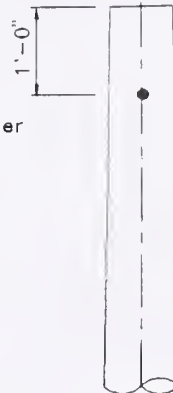
## POLE FRAMING GUIDE

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HOLE: Drill  $11/16$ " diameter



TOLERANCES

HOLES:

Holes on the brand side:  $\pm 1/8$ " from the centerline of the holes.

On the side opposite the brand:  $\pm 1/4$ " from the centerline of the holes.

Location—measured from roof:

Brand side:  $\pm 1/4$ "

Opposite side:  $\pm 1/2$ "

Diameter of hole:  $\pm 1/16$ "

Supplier's code or Trademark

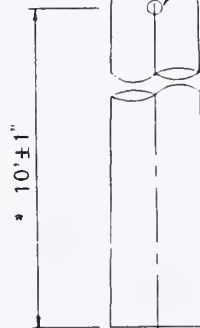
Insured warranty or Quality Assurance Mark

Plant location, month and year of treatment.

Species, preservative code and retention.

Size or designation.

\* Bottom of brand or center of metal disk shall be  $10' \pm 1"$  from the butt.  $14' \pm$  mark for poles 55' and longer.



Brand butt with proper length and class

RURAL TELEPHONE  
CONSTRUCTION PRACTICES  
POLE FRAMING

Scale: NTS.

May 29, 1990

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**METRIC CONVERSION FACTORS**

TO CONVERT FROM	TO	MULTIPLY BY
foot (ft)	meter (m)	0.3048
inch (in)	centimeter	2.54
pound per cubic foot (pcf) (lb/ft <sup>3</sup> )	kilogram per cubic meter (kg/m <sup>3</sup> )	1.601846
pound per square inch (psi) (lb/in <sup>2</sup> )	kilogram per square meter (kg/m <sup>2</sup> )	703.0696
degrees Fahrenheit (X°F)	degrees Celsius (°C)	5/9(X°-32)





